Restoration Plant and Environmental Assessment FAQs

What do you mean by restoration?

- Restoration means that we take actions to fix damage done to native plant communities and/or soil from disturbances.
- Examples include stabilizing the soil or replanting after a severe wildfire; replanting native plants and removing contaminated soil after a car accident; and loosening the soil, repairing erosion, and/or replanting in abandoned trails or roads.
- Restoration also includes removing invasive, non-native plants that have displaced native plants. Where these invasive plants have severely reduced native plants, it may be necessary to replant to help the area recover to its natural state.
    - Buffelgrass is currently the biggest threat to native plants and animals in the park.

Why is buffelgrass a problem?

- Buffelgrass is native to Africa, Asia, and arid and semi-arid Europe, and it was brought to the southwest in early 1940s for erosion control and livestock grazing.
- Each buffelgrass plant can produce hundreds or thousands of seeds each year, and seeds are dispersed by wind, water, wildlife, livestock, and humans, possibly miles away from the parent plant.
- Seeds have been found viable in the soil for up to 4 years, and it is estimated that the seeds may be viable in the soil for up to 30 years.
- Locally, a buffelgrass plant can produce seed 12-24 days after it germinates. Adult plants can produce seed in the same amount of time following rain.
- Patches have been documented doubling in size every 2-7 years in the Santa Catalina Mountains.
- Buffelgrass outcompetes and replaces many native Sonoran Desert plants. This can lead to altered nutrient cycling and changes to the rate of water infiltration into the soil.
- Buffelgrass has been documented in the laboratory to have “self enhancing” properties, producing chemicals that prevent or retard growth or germination of other plants.
- Buffelgrass can negatively affect wildlife by filling in open spaces that they need for movement and habitat and by eliminating their food plants.
- Buffelgrass is causing a fire problem.

Is buffelgrass really causing a fire problem?

- By filling in the spaces between native plants, buffelgrass is increasing the potential for fires to start and creating a continuous source of fuel for wildfires to spread.

- Buffelgrass fuel loads of 1- 4 tons per acre have been found in Saguaro National Park; this is 2 to many times higher than the usual range of Sonoran Desert fuel loads.
- Large amounts of standing, dry grass make buffelgrass fires burn hot and fast.
- In an experimental buffelgrass fire in Avra Valley, temperatures up to 1,650F were recorded. These temperatures are 2-8 times hotter than temperatures recorded in fires in the Sonoran Desert without buffelgrass.
  Buffelgrass flame lengths during this test were almost 20 feet in moderate burning conditions. Flame lengths of almost 30 feet are possible in more severe weather conditions (which is as tall as a three-story house).
- Fires with this intensity are a threat to human safety, homes, buildings, power lines, and other infrastructure. In November, 2005, a homeless man died in a buffelgrass fire.
- Many Sonoran Desert plants are severely harmed by fires, and the desert takes decades to recover after a fire, even without competition from non-native plants.
- Buffelgrass is fire tolerant and will resprout after fires.

Why haven't I heard about any buffelgrass fires?

- Many small buffelgrass fires have occurred around Tucson and along I-10 and I-19, but they are usually reported as "brush fires." (Tucson alone has over 1,000 brush fires per year.)
- There may be increasing numbers of fires as well as larger fires if buffelgrass patches keep growing and coalescing.
- Very large fires have occurred in Mexico and south Texas, where there are large areas covered by buffelgrass.

What economic impacts could buffelgrass have?

- Buffelgrass can have significant economic impacts on taxes, property damage, property values, and the tourism industry.
- Fires will cause increased fire suppression costs to fire departments and land management agencies.
- Popular destinations and views will be converted into a disturbed grassland. Wildfires on the landscape could disrupt some recreational activities, and saguaro-studded sunsets and spring wildflower displays could become a thing of the past.
- This could harm tourism, which is a cornerstone of the Tucson and Pima County economies. It is estimated that 3.5 million visitors put $2 billion a year into Tucson's economy, including $20 million of tax revenues for Tucson and Pima County.
- Degraded views and the prospect of frequent fires could discourage businesses and private citizens from choosing southern Arizona as a destination.

Can we save the Sonoran Desert, or should we save money and give up on trying to control buffelgrass?

- It is not just an issue of adding another species to the Sonoran Desert. Buffelgrass will eliminate native species, and what we recognize as the Sonoran Desert could be gone forever.

- Yes, we can save the Sonoran Desert. However, the longer we wait to respond, the more it will cost, and the likelihood of success will decline.
- The environmental and economic cost of inaction will dwarf the cost of active mitigation and control.
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Will buffelgrass be eradicated from the Sonoran Desert?

- No, not entirely.
- Yes, at small scales where dedication, commitment, and determination prevail.
- In Mexico, the government is helping ranchers to clear land to plant more buffelgrass.
- Awareness is important, but more action is needed now.

What is the best way to get rid of buffelgrass?

- It depends on how much of it there is and where it is.
- Small areas can be effectively treated by pulling only if the base of the plant where roots sprout from is removed. Pulling immediately removes fuel that can fuel a fire, but it is not cost-effective for large or remote patches.
- Spraying with the herbicide glyphosate kills the plant, but does not immediately remove the fuel for fires. The dead grass decomposes over time (losing about 1/3 of its biomass each year), and after about 3 years sprayed plants may not be able to carry a fire any more.
- Using herbicide is the most efficient technique for large and remote patches.
- No matter which method is used, repeated treatments for several years are required to eliminate viable seed in the soil.
- The more treatments in a single growing season, the better.

Is aerial spraying necessary?

- In some places, yes. Buffelgrass is spreading faster than the park can control it by pulling and using backpack sprayers.
- In remote and rugged areas, it can be unsafe to have crews treat buffelgrass on foot.
- Large patches are not feasible to treat on foot, especially in remote areas.

How far will the herbicide travel with aerial spraying?

- During tests in the Tucson Mountains in 2010, 5% of the herbicide drifted up to 75 feet from where it was intended. Models indicate that less than 1% would travel up to 90 feet. Strict guidelines on the herbicide label will be followed regarding wind speed, droplet size, spray nozzles, and use of additives to minimize herbicide drift.
- The proposed herbicides are not mobile in the soil, because they either bind with soil particles or photo-degrade fairly rapidly, thus, they don't travel very far in the soil and should not reach the groundwater.

How safe are the herbicides that you are proposing to use?

- They range from low toxicity to practically non-toxic. People who are chemically sensitive to compounds that are in the herbicides would be affected if they come into contact with them.

- Visitors and local residents will not come into contact with the herbicides, so the public will not be affected.
- If aerially spraying near a trail, we will temporarily close the trail.
- No aerial spraying will occur within 1/4 mile of any road or occupied structure or within 1/8 mile of any private land (occupied or unoccupied).
- Employees who use the herbicides are trained and use personal protective equipment when handling herbicides.

How do herbicides affect other plants?

- The most common herbicides used to control buffelgrass contain the active ingredient glyphosate (made by several companies under trade names such as RoundUp, RazorPro, Landmaster, Pondmaster, Aquamaster, Rodeo, and Touchdown). Glyphosate is a broad-spectrum chemical that can kill native plants too.
- Cacti are little affected by glyphosate because of their waxy cuticle, which prevents absorption of the herbicide.
- One way to protect native plants is to avoid spraying them. This is easy to do because the application is to individual plants with a single, hand-held nozzle.
- Aerial spraying would only be used in large, dense patches of buffelgrass. Buffelgrass crowds out native plants, and these patches actually have very few native plants left in them. Spraying these areas aerially will not kill a lot of native plants. The remaining plants are likely to die because buffelgrass is such a strong competitor.

How do herbicides affect wildlife?

- The proposed herbicides are practically non-toxic or slightly toxic to humans and wildlife, primarily when ingested or as an eye irritant. .
- The herbicides proposed for use in the park target plant-specific enzyme pathways, therefore, the impacts to wildlife and humans under normal application conditions are negligible.
- Herbicides used in the park do not contain ingredients that can cause egg-shell thinning, bio-accumulate in animal tissue, or cause other harmful, long-term effects.
- The selection of herbicides proposed for use in the park, and the amounts, concentrations, and methods used to apply them, minimize their long-term persistence in the environment, and any adverse effects.
- Terrestrial formulations of some herbicides can be toxic to aquatic animals, like frogs, but we will use aquatic formulations when we need to spray riparian areas or wetlands.

What about building up resistance to herbicides?

- Buffelgrass reproduces mainly through apomixis. This means that seeds develop without fertilization; there is no gene exchange with other buffelgrass plants; offspring are clones of the parent. Because it is apomictic and genes are not exchanged much between plants, buffelgrass is very unlikely to develop resistance to any one herbicide.
- In agricultural practices, to combat herbicide resistance, different herbicides are used..

Why not use more natural treatments, like applying vinegar, clove oil, or boiling water to buffelgrass?

- Applying vinegar may work on killing the tops of buffelgrass, but the plants would resprout from the base.
- Test trails have showed that clove oil does not appear to be effective at controlling buffelgrass.
- Some natural-based products are effective at killing only small plants like seedlings.
- They are not selective and would negatively impact native species.
- They must be applied at high concentrations to achieve any control so are extremely expensive on a per acre basis, and those high concentrations may cause negative impacts on soil microbes, which help native plants get nutrients and water from the soil.
- Boiling water may be practical on a small scale, for example in a yard on a plant growing among rocks where the roots cannot be pulled up.

How will climate change affect buffelgrass?

- Climate-induced changes in temperature and precipitation patterns will further stress native plant communities and will likely increase natural disturbances, such as drought, flooding, fire, and temperature extremes. These disturbances can weaken the ability of native plants to compete with invaders.
- Buffelgrass shows improved growth under elevated carbon dioxide levels.
- If winters become warmer, buffelgrass could grow and produce seed even faster in winter, causing buffelgrass to spread faster.
- The Rocky Mountain Climate Organization and the Natural Resources Defense Council named Saguaro NP one of the twenty-five parks in peril due to the spread of buffelgrass due to climate change.

What about mowing it?

- Buffelgrass is adapted to heavy grazing, which is similar to mowing, and it resprouts readily after both; however, mowing can help reduce the fuel present.
- Mowing can also be used prior to herbicide application to decrease biomass and remove dead leaves that prevent the herbicide from intercepting the green leaves, where the herbicide is effective.

Why not use cattle to graze buffelgrass?

- Grazing could reduce the biomass of buffelgrass, reducing fuel load, but buffelgrass would resprout and continue to spread.
- Buffelgrass comes from an ecosystem with large grazing animals, and it is very tolerant of heavy grazing.
- Cattle graze or browse native plants in addition to buffelgrass, and many Sonoran Desert species are less tolerant of grazing.
- Negative impacts from grazing and associated trampling have been documented on desert plant and animal communities, and especially on the saguaro cactus. This is the reason that grazing was stopped at Saguaro NP and Organ Pipe Cactus NM.

- Proper management of livestock requires a significant investment in herding, fencing, and providing water to ensure that they stay where they are needed.
- Reducing the amount of buffelgrass by grazing would reduce fire intensity because the amount of available fuel would be reduced, but grazing would not limit fire spread--basically, short would buffelgrass burn and carry fire as well.

What about burning to control buffelgrass?

- Fires will remove above-ground plant parts and may kill some buffelgrass seeds on the surface, but most seeds below the soil surface will survive. The roots and below-ground part of the stems survive fire, and fire stimulates it growth.
- Many Sonoran Desert species will be severely harmed by buffelgrass fires, and the desert would take decades to recover from a fire.

Is biological control an option?

- There are no biological control agents currently approved for use against buffelgrass. At the present time, there is only one potential agent, a leaf blight fungus (*Cochliobolus australiensis*), that is being researched by a scientist with the US Forest Service Rocky Mountain Research Station.
- Buffelgrass has been harmed by an outbreak of a fungus, *Pyricularia grisea*, in Texas and Australia, where it has also been introduced for cattle forage.
- While there is potential for an agent to be discovered, many years of research are needed to assure that the control agent would not cause unwanted harm to non-target plants.

Is buffelgrass the only non-native plant impacting the Sonoran Desert?

- No. Plants including African lovegrasses, Bermudagrass, fountain grass (a close relative of buffelgrass), and Sahara mustard are also threatening the desert, while species like salt cedar are impacting riparian areas along rivers and streams.
- Newly identified invaders are also a cause of concern. These include Malta star-thistle, soft-feather pappusgrass, horehound, yellow bluestem and stock (*Matthiola parviflora*).